1. Introduction

EuroSystem and EuroStep are both 3 axis intelligent motor controllers that provide a comprehensive range of features for controlling servo and step motors. EuroSystem allows servo and step motors to be mixed in the same multi-axis system with a highly flexible programming language, MINT. EuroStep provides support for up to three open loop step motors using the same programming language, MINT.

Features:

- *Stand-alone operation or controlled by host over RS232/485 serial link, up to 16 cards on multidrop*
- *Easy to use BASIC-like motion control language, MINT*
- *28k bytes non-volatile program/data memory*
- *On board program editor*
- *Circular and linear interpolation*
- *Microstepping control up to 200kHz*
- *Step, Direction and Boost outputs compatible with industry standard drives*
- *8 uncommitted digital inputs and outputs for machine control*
- *3 Limit switches, 3 Home switches and Error input*
- *Two 10 bit analogue inputs for interface to joy-stick or sensors*
- *Pulse follower input*
- *+5V, ±12V power requirement*
- *Expansion port for option boards such as extended I/O, keypad and display*

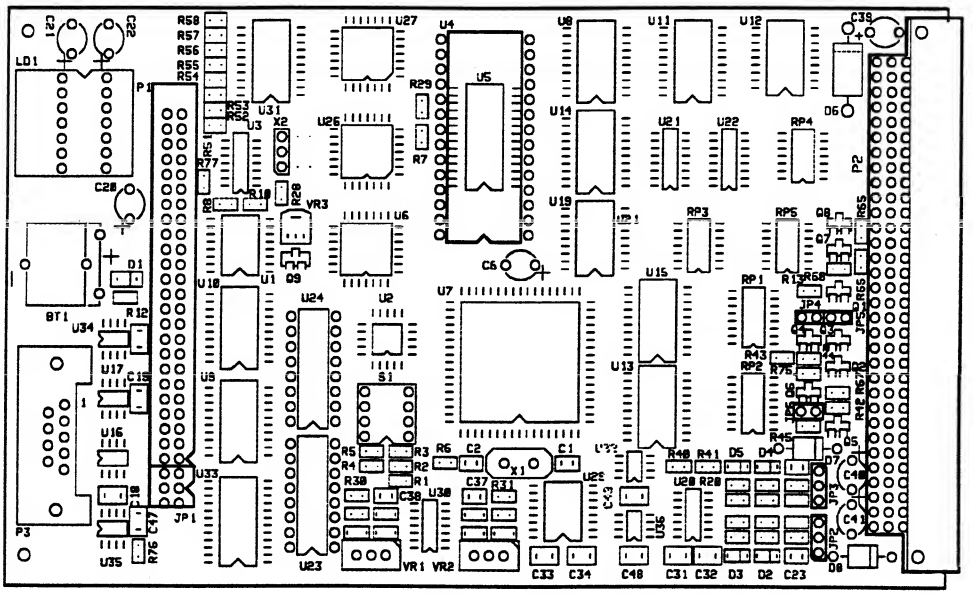
For servo systems, you are advised to read the section 'Servo System Set-up' which explains, in detail, how to test for the correct wiring of amplifiers to EuroSystem and the setting of system gains.

1.1. MINT

MINT, standing for Motion INTerpreter, is a structured form of BASIC, custom designed for EuroSystem/EuroStep. MINT has been written to allow you to very quickly get 'up and running' with simple motion programs, whilst providing a wide range of more powerful commands for complex applications.

In addition to the usual BASIC commands, plain English keywords are used to control motion and input/output. These keywords allow control of motor position, speed, torque including interpolation and synchronisataion of multiple axes. You also have full software control over the basic motor control parameters. MINT supports both servo and stepper systems, allowing different motors to be mixed in the same multi-axis system.

2. EuroSystem/EuroStep I/O



96 way DIN connector for I/O connection

Figure 1.1:EuroSystem/EuroStep Controller layout.

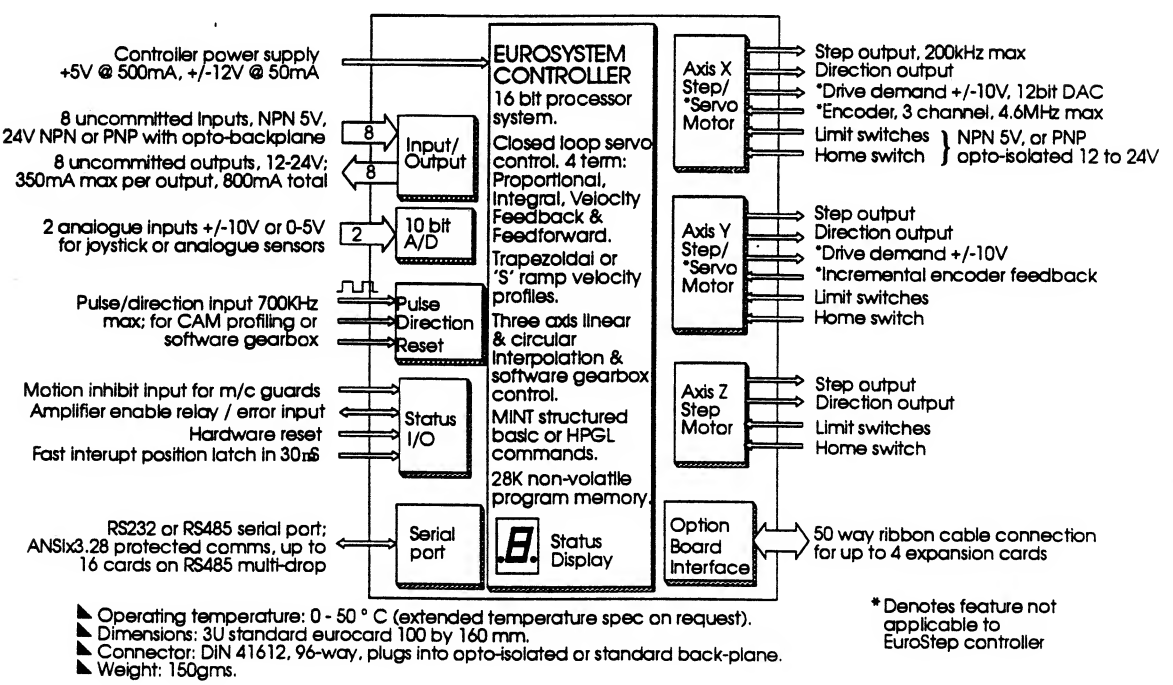


Figure 1.2: EuroSystem/EuroStep Controller Block Diagram

2.1. 96-way DIN Connector Pinout

I/O associated with EuroSystem and EuroStep are illustrated in Figures 1.2 and Figures 1.3. They include limit switch inputs, home switch inputs, amplifier demand outputs and error output. All connections are brought out at one end of the board on a DIN 41612 96-way connector. Normally you would use a backplane (isolated or non-isolated) for your connections, but for OEM applications the pin-out is explained in more detail below:

c			b			a		
Vcc	1	❑	Vcc	1	❑	Vcc	1	❑
Vcc	2	❑	Vcc	2	❑	Vcc	2	❑
GND	3	❑	GND	3	❑	GND	3	❑
USR-OUT-6	4	❑	USR-OUT-7	4	❑	USR-OUT-COM	4	❑
USR-OUT-3	5	❑	USR-OUT-4	5	❑	USR-OUT-5	5	❑
USR-OUT-0	6	❑	USR-OUT-1	6	❑	USR-OUT-2	6	❑
CHB-1	7	❑	CHA-0	7	❑	CHB-0	7	❑
IDX-1	8	❑	IDX-0	8	❑	CHA-1	8	❑
!CHA-1	9	❑	!IDX-0	9	❑	!IDX-1	9	❑
!CHB-0	10	❑	!CHA-0	10	❑	!CHB-1	10	❑
ERROR-IN	11	❑	ERROR-OUT	11	❑	GND	11	❑
RESET-IN	12	❑	GND	12	❑	GND	12	❑
GND	13	❑	BOOST-1	13	❑	BOOST-0	13	❑
PULSE-2	14	❑	PULSE-1	14	❑	PULSE-0	14	❑
DIR-2	15	❑	DIR-1	15	❑	DIR-0	15	❑
BOOST-2	16	❑	GND	16	❑	DSR	16	❑
GND	17	❑	GND	17	❑	DTS	17	❑
USR-IN-4	18	❑	FAST-INT	18	❑	USR-IN-2	18	❑
USR-IN-3	19	❑	USR-IN-5	19	❑	USR-IN-7	19	❑
USR-IN-6	20	❑	USR-IN-1	20	❑	RXD	20	❑
USR-IN-0	21	❑	RTS	21	❑	TXD	21	❑
OPT-4	22	❑	OPT-2	22	❑	CTS	22	❑
HOME-2	23	❑	OPT-3	23	❑	OPT1	23	❑
PULSE-IN	24	❑	HOME-1	24	❑	LIMIT-2	24	❑
DIR-IN	25	❑	LIMIT-1	25	❑	STOP	25	❑
HOME-0	26	❑	RESET-CNTR	26	❑	LIMIT-0	26	❑
DEMAND-0	27	❑	DEMAND-1	27	❑	-ANALOGUE-2	27	❑
+ANALOGUE-2	28	❑	+ANALOGUE-1	28	❑	-ANALOGUE-1	28	❑
+12V	29	❑	+12V	29	❑	+12V	29	❑
AGND	30	❑	AGND	30	❑	AGND	30	❑
-12V	31	❑	-12V	31	❑	-12V	31	❑
SCRN	32	❑	SCRN	32	❑	SCRN	32	❑

96-way connector pin-out

Signal	Comments	Pin No.
Drive Demands		
DEMAND-0	Demand signal out, +/-10V, axis 0	c27
DEMAND-1	Demand signal out, +/-10V, axis 1	b27
Encoders		
CHA-0	Encoder channel A, true, axis 0	b7
!CHA-0	Encoder channel A, compliment, axis 0	b10
CHB-0	Encoder channel B, true, axis 0	a7
!CHB-0	Encoder channel B, compliment, axis 0	c10
IDX-0	Encoder INDEX, true, axis 0	b8
!IDX-0	Encoder INDEX, compliment, axis 0	b9
CHA-1	Encoder channel A, true, axis 1	a8
!CHA-1	Encoder channel A, compliment, axis 1	c9
CHB-1	Encoder channel B, true, axis 1	c7
!CHB-1	Encoder channel B, compliment, axis 1	a10
IDX-1	Encoder INDEX, true, axis 1	c8
!IDX-1	Encoder INDEX, compliment, axis 1	a9
Home/Limits		
LIMIT-0	Limit input, axis 0	a26
HOME-0	Home input, axis 0	c26
LIMIT-1	Limit input, axis 1	b25
HOME-1	Home input, axis 1	b24
LIMIT-2	Limit input, axis 2	a24
HOME-2	Home input, axis 2	c23
Miscellaneous		
PULSE-IN	Pulse input, pulse follower	c24
DIR-IN	Direction input, pulse follower	c25
RESET-CNTR	Timer 2 reset input	b26
RST-IN	System reset, input	c12
STOP	Stop execution, input	a25
ERROR-OUT	Motion/System error output	b11
ERROR-IN	Motion/System error input	c11
FAST-INT	User hardware INTERRUPT	b18
Digital Inputs		
USR-IN-0	User input, bit 0	c21
USR-IN-1	User input, bit 1	b20
USR-IN-2	User input, bit 2	a18
USR-IN-3	User input, bit 3	c19
USR-IN-4	User input, bit 4	c18
USR-IN-5	User input, bit 5	b19
USR-IN-6	User input, bit 6	c20
USR-IN-7	User input, bit 7	a19
Digital Outputs		
USR-OUT-0	User output, bit 0	c6
USR-OUT-1	User output, bit 1	b6
USR-OUT-2	User output, bit 2	a6
USR-OUT-3	User output, bit 3	c5
USR-OUT-4	User output, bit 4	b5
USR-OUT-5	User output, bit 5	a5
USR-OUT-6	User output, bit 6	c4
USR-OUT-7	User output, bit 7	b4
USR-OUT-COM	Common diode clamp	a4

Analogue Inputs		
+ANALOGUE-1	Analogue input 1, non-inverting	b28
-ANALOGUE-1	Analogue input 1, inverting	a28
+ANALOGUE-2	Analogue input 2, non-inverting	c20
-ANALOGUE-2	Analogue input 2, inverting	a27
Stepper		
PULSE-0	Pulse output stepper axis 0	a14
DIR-0	Direction output stepper axis 0	a15
BOOST-0	Boost or full/half step output stepper axis 0	a13
PULSE-1	Pulse output stepper axis 1	b14
DIR-1	Direction output stepper axis 1	b15
BOOST-1	Boost or full/half step output stepper axis 1	b13
PULSE-2	Pulse output stepper axis 2	c14
DIR-2	Direction output stepper axis 2	c15
BOOST-2	Boost or full/half step output stepper axis 2	c16
Serial Port		
TXD	Transmitted data (TxD true)	a21
RXD	Received data (RxD true)	a20
RTS	Request to send (TxD compliment)	b21
CTS	Clear to send (RxD compliment)	a22
DSR	Connected to DTR	a16
DTR	Connected to DSR	a17
Option Board		
OPT1	Option board I/O	a23
OPT2	Option board I/O	b22
OPT3	Option board I/O	b23
OPT4	Option board I/O	c22
Power Supply and References		
-12V	-12V @ 100mA	c31,b31,a31
+12V	+12V @ 100mA	c29,b29,a29
5V	+ 5V @ 500mA	c1,c2,b1,b2, a1,a2
GND	0V Digital ground	
AGND	0V Analogue ground	c30,b30,a30
SCRN	0V Power ground / Cable screen	c32,b32,a32

Inputs are always in their active (high) state unless they are pulled low by external circuitry, providing fail safe operation. Before the system will operate, you must connect the limit switches and the stop switch either to their respective switches or to ground. Failure to do so will result in a limit error on the controller and a stop condition. This is indicated by the LED status display showing either an 'L' or an 'S'.

The following sections explain each of the I/O types in detail. A pin-out table lists all the relevant pins on the DIN connector and the backplane for that I/O function. The pin number on the DIN connector is given in brackets. The backplane detail shows the connector block followed by the pin name.

2.2. Switch Types

The inputs are active high and must be tied to ground through normally closed switches. The system will fail to operate with normally open switches.

2.3. Limit Inputs

Pinout:

Din Connector	Backplane	Description
LIMIT-0 (a26)	HOME/LIMIT: L0	Limit switch axis 0
LIMIT-1 (b25)	HOME/LIMIT: L1	Limit switch axis 1
LIMIT-2 (a24)	HOME/LIMIT: L2	Limit switch axis 2
GND	HOME/LIMIT: Gnd	Digital ground

In a typical application, the limit switch inputs would be connected to normally closed micro switches on the axis. Hitting the limit switch will cause the switch to become open circuit, the respective input is pulled high internally, resulting in a limit error and the axis coming to an immediate stop. This is indicated by an 'L' on the LED status display and the ERROR keyword which will return 3. See the MINT Programming Guide to more details on the ERROR keyword and error handling within MINT.

Because there is only one limit input per axis, if two end-of-travel limit switches are fitted then they must both be connected in series as shown below.

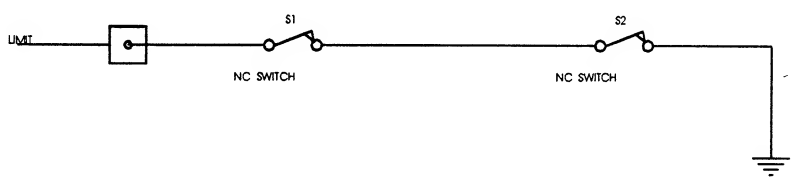


Figure 2.1 Dual Limit input switch connection.

A possible problem with this arrangement is that is it not possible to determine in software which end-of-travel switch has been hit by simply reading the limit input. This can be overcome by introducing a double pole limit switch at one end of the axis and connecting this to the home input or a spare digital input. This means that when a limit switch is hit the program can determine whether this is the forward or reverse limit by reading the status of the home switch or relevant digital input.

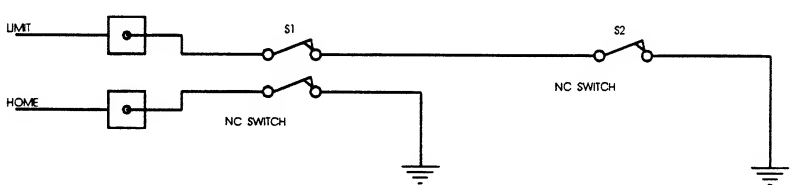


Figure 2.2 Dual Limit and Home/Input connection.

In many applications it is necessary to have separate limit and home switches. Since the controller has only limit input per axis it is best to arrange the active areas of the switches as shown below.